

GREAT LAKES HYPERLOOP: STATUS UPDATE

Community Advisory Council
September 27, 2019



ACTION REQUESTED

No action requested

PREVIOUS ACTION

Previous presentations to the Council



FEASIBILITY STUDY UPDATE

PROJECT SCOPE

Four Phases

- Project objectives and organization
- Site reconnaissance and preliminary route analysis
- Technical and financial feasibility
- Project development cost and schedule



PHASE 1: PROJECT OBJECTIVES AND ORGANIZATION

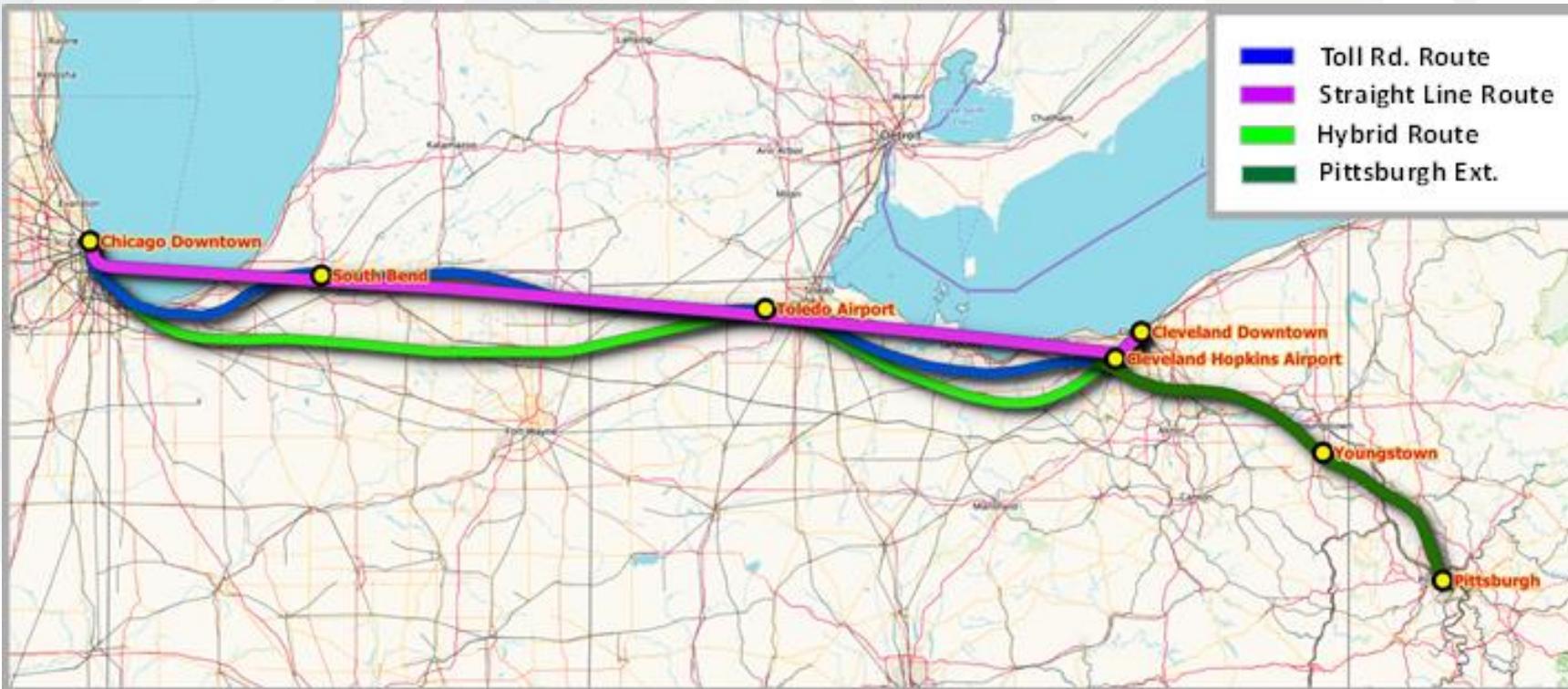
Project Execution Plan Communications and Stakeholder Engagement Plan



PUBLIC STAKEHOLDER PROCESS



PHASE 2: SITE RECONNAISSANCE AND PRELIMINARY ROUTE ANALYSIS



PITTSBURGH UPDATE

- Route Extended to Pittsburgh June, 2019
- NOACA received a grant from the Richard King Mellon Foundation in the amount of \$100,000



Richard
King
Mellon
Foundation



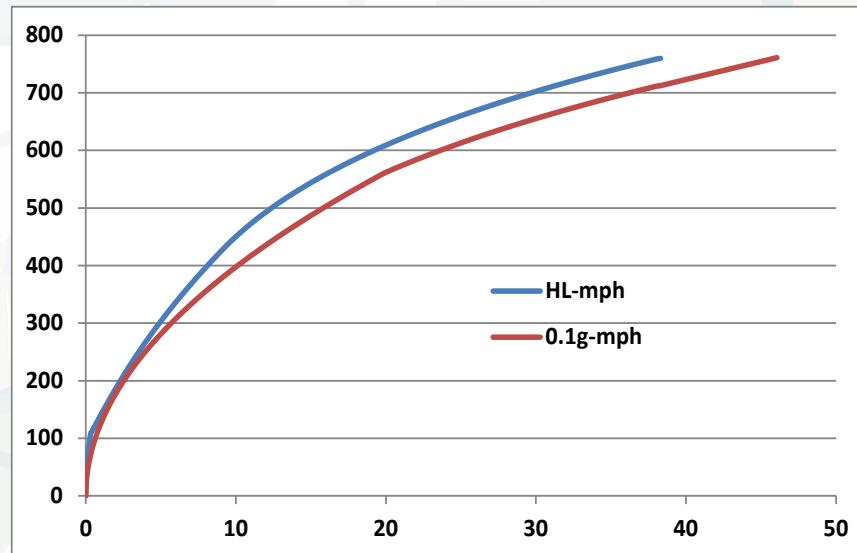
ADDITIONAL FEASIBILITY STUDY TASKS

- Second Pittsburgh route analysis (Pittsburgh airport)
- Pittsburgh station analysis
- Chicago station analysis
- Cleveland station analysis
- Less than truckload – modal split refinement
- Project meetings

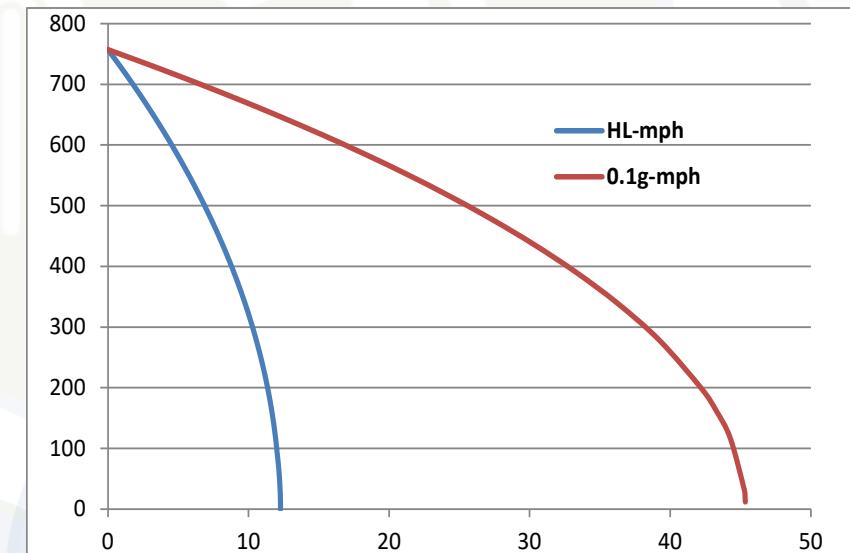


PHASE 2: SITE RECONNAISSANCE AND PRELIMINARY ROUTE ANALYSIS

Acceleration



Braking



0.1g max acceleration/braking rate

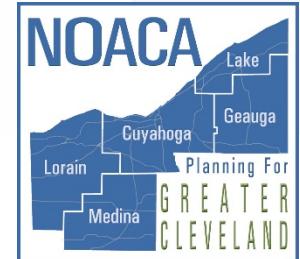
PHASE 2: SITE RECONNAISSANCE AND PRELIMINARY ROUTE ANALYSIS

	Pittsburgh	Youngstown	Cleveland	Hopkins Apt	Toledo	South Bend	
Youngstown	0:12:05						
Cleveland	0:24:04	0:16:07					
Hopkins Apt	0:21:56	0:13:59	0:04:31				
Toledo	0:35:48	0:27:51	0:19:51	0:17:41			
South Bend	0:51:13	0:43:16	0:38:55	0:33:06	0:19:27		
Chicago	1:03:15	0:55:18	0:47:18	0:45:08	0:31:29	0:16:04	

**LOCOMOTION™
TPC Time**

	Pittsburgh	Youngstown	Cleveland	Hopkins Apt	Toledo	South Bend	
Youngstown	17						
Cleveland	29	21					
Hopkins Apt	27	19	10				
Toledo	41	33	25	23			
South Bend	56	48	44	38	24		
Chicago	68	60	52	50	36	21	

**Schedule Time
with 5-min Slack**

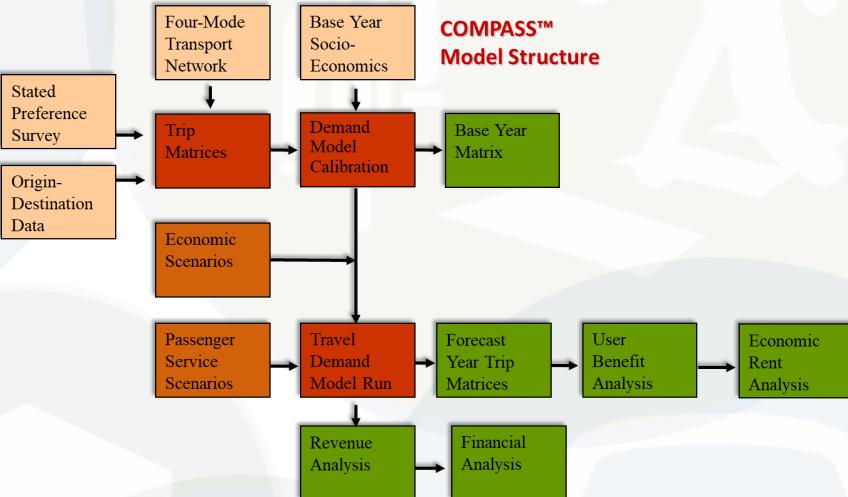


PHASE 3: TECHNICAL AND FINANCIAL FEASIBILITY

Financial Analysis

	Total to 2040	2012	2013	2014	2015	2016	2017
Thousands of 2006 \$							
Revenues							
Ticket Revenue	\$1,080,230	\$13,567	\$25,107	\$28,659	\$29,422	\$30,185	\$30,948
On Board Services	\$86,418	\$1,085	\$2,009	\$2,293	\$2,354	\$2,415	\$2,476
Express Parcel Service (Net Rev)	\$54,011	\$678	\$1,255	\$1,433	\$1,471	\$1,509	\$1,547
Total Revenues	\$1,220,660	\$15,331	\$28,371	\$32,385	\$33,247	\$34,109	\$34,971
Train Operating Expenses							
Energy and Fuel	\$75,081	\$2,013	\$2,013	\$2,013	\$2,013	\$2,013	\$2,013
Train Equipment Maintenance	\$204,890	\$5,494	\$5,494	\$5,494	\$5,494	\$5,494	\$5,494
Train Crew	\$96,367	\$3,323	\$3,323	\$3,323	\$3,323	\$3,323	\$3,323
On Board Services	\$80,631	\$1,833	\$2,295	\$2,437	\$2,467	\$2,498	\$2,528
Service Administration	\$147,171	\$5,075	\$5,075	\$5,075	\$5,075	\$5,075	\$5,075
Total Train Operating Expenses	\$604,139	\$17,738	\$18,200	\$18,342	\$18,372	\$18,403	\$18,434
Other Operating Expenses							
Track & ROW Maintenance	\$114,663	\$3,954	\$3,954	\$3,954	\$3,954	\$3,954	\$3,954
Station Costs	\$40,547	\$1,398	\$1,398	\$1,398	\$1,398	\$1,398	\$1,398
Sales & Marketing	\$51,009	\$643	\$1,190	\$1,358	\$1,394	\$1,429	\$1,465
Insurance Liability	\$43,345	\$549	\$1,015	\$1,158	\$1,188	\$1,218	\$1,248
Total Other Operating Expenses	\$249,564	\$6,544	\$7,557	\$7,868	\$7,934	\$7,999	\$8,065
Total Operating Expenses	\$853,703	\$24,283	\$25,757	\$26,210	\$26,306	\$26,402	\$26,498
Cash Flow From Operations	\$366,957	(\$8,952)	\$2,614	\$6,175	\$6,941	\$7,707	\$8,473
Operating Ratio	1.43	0.63	1.10	1.24	1.26	1.29	1.32

Market Analysis



Hyperloop Oriented Development

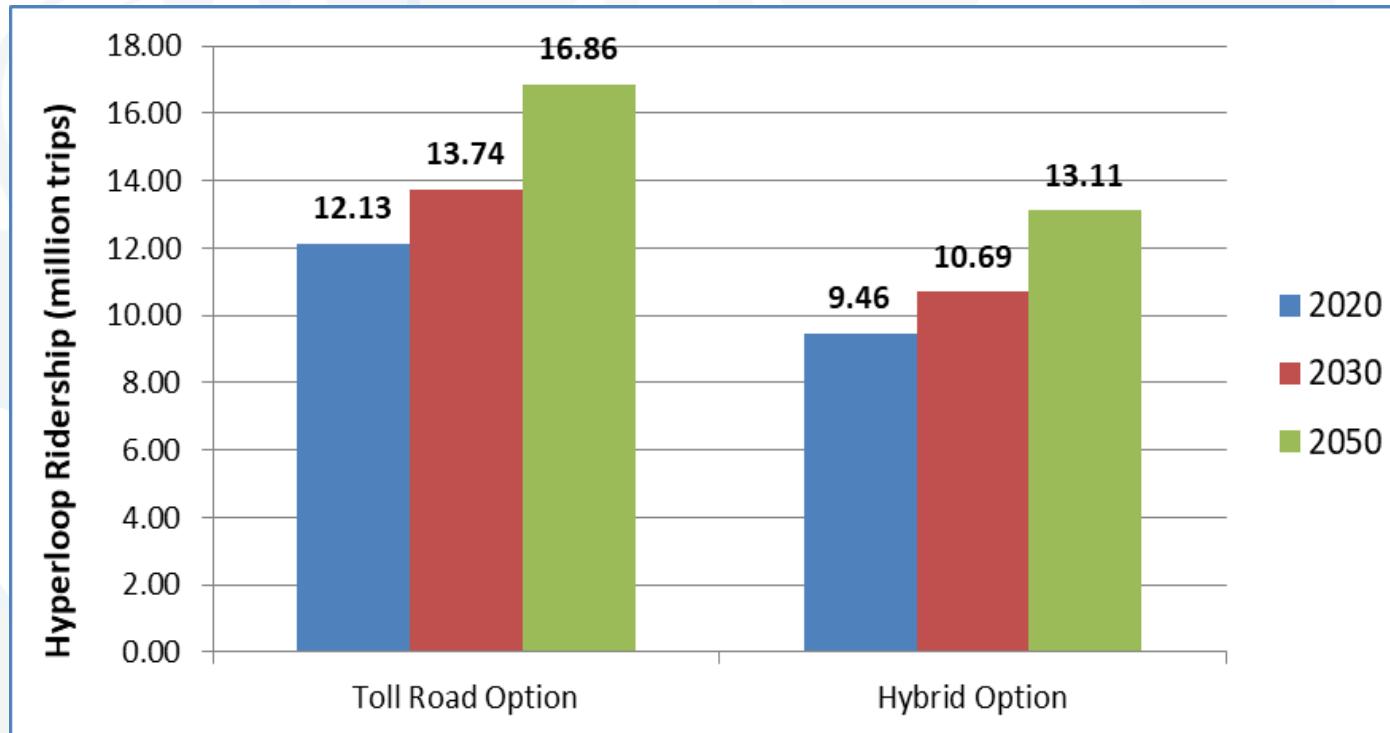


Cost Benefit Analysis

	Billions in 1998 dollars
MWRRS User Benefits	\$6.4
Consumer Surplus (e.g., time savings expressed as dollars)	
System Revenues	\$6.8
Other Mode User Benefits	
Airport Congestion Relief	0.7
Highway Congestion Relief	1.3
Resource Benefits	
Air Carrier Operating Cost Reductions	0.4
Emission Reductions	0.3
Total Benefits	\$15.9
Costs	
Capital	\$4.1
Financing	0.2
Operating and Maintenance	5.0
Total Costs	\$9.3
Ratio of Benefits to Costs	1.7



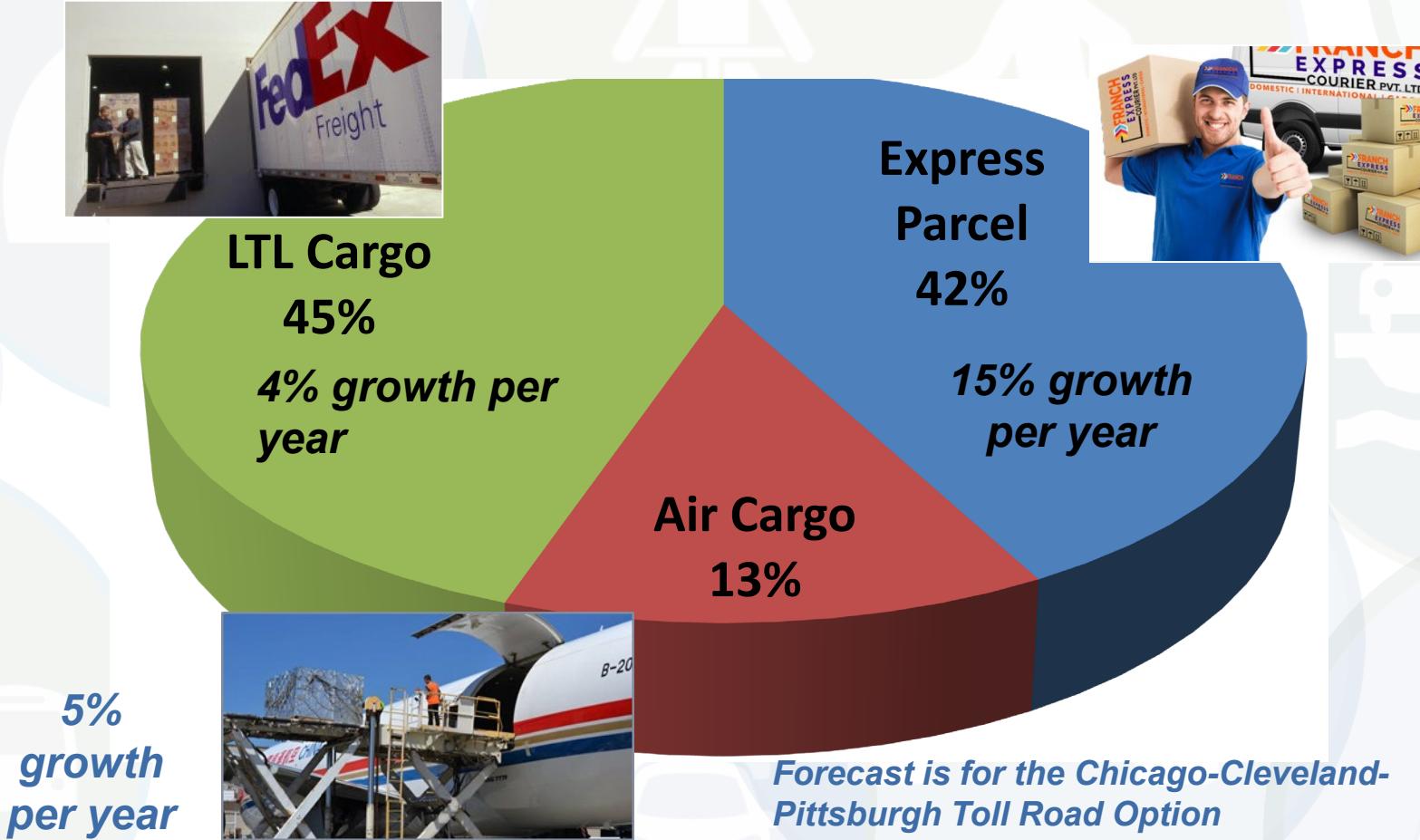
HYPERLOOP RIDERSHIP FORECAST IN THE CLEVELAND-CHICAGO-PITTSBURGH CORRIDOR



- Toll Road Option 3 intermediate stops (South Bend, Toledo, Youngstown)
- Hybrid Option 2 intermediate stops (Toledo, Youngstown)



2022 FREIGHT REVENUE FORECAST



2022 TOTAL PASSENGER AND FREIGHT REVENUE BY SOURCE IN THE CLEVELAND-CHICAGO- PITTSBURGH CORRIDOR



Forecast is for the Chicago-Cleveland-Pittsburgh Toll Road Option



CLEVELAND TO CHICAGO/PITTSBURGH CORRIDOR FINANCIAL AND COST BENEFIT RESULTS FOR HYPERLOOP

Discount Rate	3.0%	7.0%
Benefits to Users		
System Passenger Revenues	\$20,992.76	\$10,553.44
Express Parcel Net	\$11,313.79	\$4,993.85
Real Estate Net	\$1,973.32	\$992.02
Air Cargo Rev	\$1,455.93	\$653.77
LTL Cargo Rev	\$3,976.98	\$1,838.29
Total Operating Revenues	\$39,712.79	\$19,031.37
Users Consumer Surplus	\$18,138.36	\$9,053.41
Total User Benefits	\$57,851.15	\$28,084.79
Benefits to Public at Large		
Env + Resource (Air)	\$3,813.54	\$1,917.14
Env + Resource (Auto)	\$5,546.97	\$2,788.56
Freight Envir. Benefit	\$4,186.68	\$1,871.48
Total Public at Large Benefits	\$13,547.19	\$6,577.18
Total Benefits	\$71,398.33	\$34,661.96
Costs		
Passenger Op Cost	\$8,139.89	\$4,118.24
Air Cargo Cost	\$291.19	\$130.75
LTL Cargo Cost	\$1,136.28	\$525.23
Capital Cost	\$23,633.80	\$21,004.76
Total Costs	\$33,201.16	\$25,778.98
Benefits Less Costs	\$38,197.18	\$8,882.98
Benefit/Cost Ratio	2.15	1.34
Operating Ratio	4.15	3.99

Financial Return - IRR
= 4.5% Real
= 6.5% Nominal

Economic Return - IRR
= 9.8% Real
= 11.8% Nominal



SOCIOECONOMIC AND TRANSFER PAYMENTS IMPROVEMENTS SUMMARY

Economic Supply Side Items	Economic Supply Side Improvements
Direct Socioeconomic Benefits	
Employment (2025~2050 man year)	931,745
Income (2025~2050, billion \$)	47.6
Property Value (2025~2050, billion \$)	74.8
Transfer Payments (Tax Benefits)	
Local Income Tax (2025~2050, billion \$)	2.0
Federal Income Tax (2025~2050, billion \$)	9.4
Property Tax (2025~2050, billion \$)	1.3

- Increase in Income equals twice the capital cost of the project
- Property Value increase equals three times the capital cost of the project
- Expanded Tax Base equals 50 – 55 percent of project capital costs



PROPERTY VALUE IMPROVEMENT BY STATION COVERAGE AREA

Station Name	Property Value Improvement 2020~2050 (billion \$)
Chicago, IL	27.1
Midway Airport, IL	6.9
South Bend, IN	5.5
Toledo, OH	5.2
Hopkins Airport, OH	3.0
Cleveland, OH	12.3
Youngstown, OH	3.0
Pittsburgh, PA	11.9
Total	74.8

- Hyperloop with an average speeds of 400 to 600 mph, brings massive transit oriented development (TOD) to station areas



STATION LOCATION AT 150 MPH

Outline planning permission was granted in December 2006 for nearly 8 million sq. ft. of land to be called “King’s Cross Central.” This includes up to 25 large office buildings, 20 new streets, 10 new public spaces, the restoration and refurbishment of 20 historic buildings and structures, and up to 2,000 homes.



**\$16 Billion Property
Development
Program**

King’s Cross Central is one of Europe’s largest urban regeneration projects. The 24 hectare site is bordered by the new Eurostar line from France and bisected by Regent’s Canal.



PHASE 4: PROJECT DEVELOPMENT COST AND SCHEDULE

Conceptual Cost Estimate
Design Build Readiness
Project Schedule
Project Implementation Strategies



